Realitivistic Relativity

A hypothetical study into the relativistic symmetry between celestial and quantum objects

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Abstract

This paper examines the hypothetical possibility of relativistic symmetry between the celestial and quantum realms based solely on a scale difference between the two systems and the concept of space-time density derived from Einstein's curvature of space. The exploratory analysis presented in this paper derives two surprising mathematical coincidences including a new scale relativity mass equation which calculates Jupiter's relativistic mass (1.898×10^{27} kilograms) to the numerical value of an electron charge (1.6×10^{-19} coulombs) exactly. This simple equation strongly suggests a direct mathematical relation between charge and mass, gives credence to the likelihood that the Universe is fractal in nature and that dimension changes with scale. Essentially this equation possibly unites our perception of mass at the celestial scale to that of charge at quantum scale which has enormous implications for all of physics.

Keywords: Relativity, Quantum Cosmology, Cosmology, Exploratory

Table of Contents

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Background

The recent demotion of Pluto as a planet to a dwarf planet sparked insight into a numeric relationship between our Solar System and the Beryllium atom based solely on the number of gas giants and rock planets our system has and the atomic number of the Beryllium atom. This paper is the product of that initial insight. The analytical precedence to this examination is to conceptually shrink a star system, specifically the Sol system, by a certain scale factor to be derived between the documented radii of Sol system and its hypothetical corresponding atom (Beryllium) in order to subsequently derive a mass transform equation from the scale difference. The concept is novel but simple.

Hypothesis

The hypothesis states that atoms and star systems are the same thing but exist in different velocity frames of reference (relativistic space and time), or space-time densities which will be explained later. It also states more specifically that:

- electrons and gas giants are relative scale equivalents
- the inner planetary system is the relative scale equivalent of an atomic nucleus
- the inner rock planets are relative scale equivalents to neutrons
- stars are comprised of one or more relative scale equivalents to protons fused together by the star's own matter
- the Asteroid and Kuiper belt are natural formations common to the majority of systems distinguishing a separation between the inner and outer system
- the Kuiper belt and Scattered disc form the outer boundary of the system
- specific atoms have relative scale equivalent star systems based on the corresponding atomic number to the number of gas giants

Fig 1.0 depicts the corresponding quantum to celestial equivalencies. In regards to our Solar System (the Sol star system), its relative atomic equivalent would be the Beryllium atom due to this atom having four electrons orbiting its nucleus akin to our Solar System's four gas giants orbiting its inner planetary system. Finally this hypothesis postulates that mass is equivalent to charge but perceived as an independent quantitative unit of measurement from that of mass due to its accelerated velocity frame of reference or space-time density and that dimension changes with scale.

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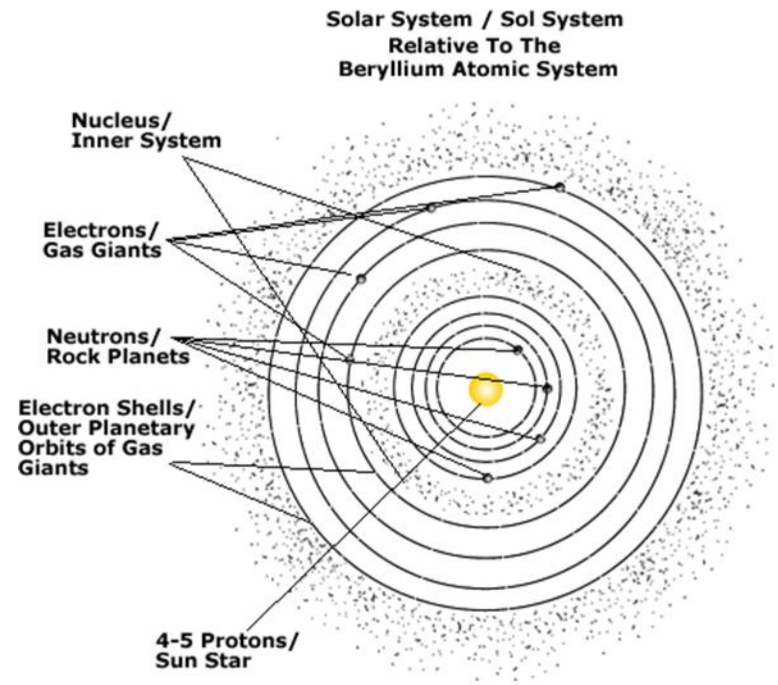

Fig 1.0

Mathematical Observations

The mathematical derivation of a scale difference between our Solar System and the Beryllium atom would result in a value that can be considered a relativistic scale constant between celestial and quantum scale. This value will be called the *Reality Scale Constant* $\boldsymbol{S}$. This value is simply calculated using the following:

$\boldsymbol{Radius\ of\ Be\ Atom} = \boldsymbol{r_{Be\ Atom}} = \mathbf{105}\ \boldsymbol{pm}\ (\boldsymbol{measured\ radius})$ **Val 1.0**

$\boldsymbol{Kuiper\ Belt\ ranges\ from}\ \mathbf{55}\boldsymbol{AU}\ \boldsymbol{to}\ \mathbf{100}\boldsymbol{AU}$ **Val 1.2**

$\boldsymbol{Radius\ of\ Solar\ System} = \boldsymbol{r_{Solar\ System}} = \mathbf{77.5}\ \boldsymbol{AU}\ average\ limit\ of\ Kuiper\ Belt\ \&\ Scatter\ Disc$ **Val 1.3**

$\mathbf{1}\boldsymbol{AU} = \mathbf{149597870691\ m}$ **Val 1.4**

$$\boldsymbol{S} = \frac{\boldsymbol{r_{Solar\ System}}}{\boldsymbol{r_{Be\ Atom}}} \quad \textbf{Eq. 1.0}$$

$$\boldsymbol{r_{Solar\ System}} = (\mathbf{77.5}\boldsymbol{AU})(\mathbf{149597870691}) = \mathbf{11593834978552.5}\ \boldsymbol{m}$$

$$\boldsymbol{S} = \mathbf{11593834978552.5}\ \boldsymbol{m}\ /\ \mathbf{105}\boldsymbol{pm} = \mathbf{110417475986214285714285.71}$$

$$\boldsymbol{S} = \mathbf{1.1042}\boldsymbol{x}\mathbf{10^{23}}$$

$$\boldsymbol{S} = \boldsymbol{c_o}^{\mathbf{2.7183585241453516344163427598787}} = \mathbf{1.1042}\boldsymbol{x}\mathbf{10^{23}} \quad \textbf{Eq. 1.1}$$

$$\boldsymbol{c_o} = \mathbf{299792458} \approx \mathbf{3.0}\boldsymbol{x}\mathbf{10^{8}}\ (\boldsymbol{no\ units}) \quad \textbf{Eq. 1.2}$$

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$$c = c_o \, m/s$$

$$2.71835852414535163441634275987 87 \approx e = 2.718281828459 \quad \text{Eq. 1.3}$$

$$S = {c_o}^e = {c_o}^{2.718281828459\ldots} = 110252305513197750127947.1526 \quad \text{Eq. 1.4}$$

$$S = 1.1025x10^{23}$$

$$Percentage\ similarity = \left(\frac{{c_o}^e}{1.1042x10^{23}}\right)(100\%) = 99.8\%\ similarity. \quad \text{Eq. 1.5}$$

The variable r_{Be} is the radius of the Beryllium atom, c_o is the numerical value of the speed of light and e is Euler's and Bernoulli's mathematical constant. S is $1.1025x10^{23}$ which is the scale difference between quantum and celestial realms and is remarkably also equal to $S = {c_o}^e$.

The significance of $S = {c_o}^e$ is that it details a relation to two universal constants where one is a dimensional constant relating to velocity and the other is a mathematical constant relating to an infinite series and exponential growth. This relation explicitly derives the value of S as a function of the speed of light c explicitly. Implicitly, this relation relates scale as a function of velocity as expressed in Eq. 1.6. Further, the presence of the mathematical constant e in this relation implicitly deduces that scale is a relation to an infinite series and exponential growth relating to velocity. This relation is further explored in the section *Space-Time Density* with the explanation and formulation of relativistic velocity frames of reference in direct relation to scale.

$$s = f(v) = v^e = \left(\frac{dx}{dt}\right)^e \quad \text{Eq. 1.6}$$

If electrons are relative equivalents to planetary gas giants such as Jupiter, then electrons would be immensely denser than a gas giant in order to be equivalent. Utilizing the value of S, a quantum to celestial mass-density formula can be derived. As perceived by us, the density of quantum matter would be S times denser than celestial matter because the distance between quantum atoms (sub-quantum particles) in quantum matter is S times smaller in any direction, thus quantum density is S times greater.

The dots (points) in **Fig 2.0** represent atoms which will also reduce in size by a factor of S along with the distance between every atom also reducing by a factor of S.

$$\rho_q = S\rho_o \quad \text{Eq. 2.0}$$

The variable ρ_q is the quantum mass-density and ρ_o is celestial mass-density.

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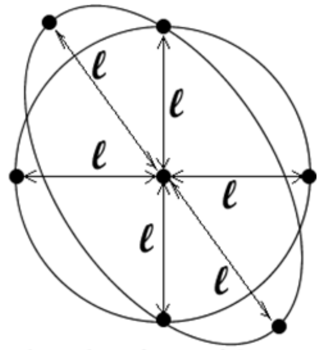

ℓ reduces by a factor of S

Fig 2.0

The key here is each atom's size also reduces by a factor S, meaning they are no longer atoms as we perceive them to be and are perceived as sub-quantum particles, which directly affects our perception of matter and density. They are point particles and density is derived in relation to the number of point particles that exist in a given volume of space. Thus the perceived mass-density increases by a simple factor of S. So instead of mass reducing by an assumed or expected factor of S^3, which would represent volume, it reduces by a factor of S^2. The following will show this:

$$\frac{m_q}{\frac{4}{3}\pi r_q^3} = S\frac{m_o}{\frac{4}{3}\pi r_o^3} \qquad \textbf{Eq. 2.1}$$

$$\frac{m_q}{r_q^3} = S\frac{m_o}{r_o^3} \qquad \textbf{Eq. 2.3}$$

$$\frac{m_q}{\left(\frac{r_0}{S}\right)^3} = S\frac{m_o}{r_o^3}$$

$$m_q = m_o\frac{S\left(\frac{r_0}{S}\right)^3}{r_o^3} \qquad \textbf{Eq. 2.4}$$

$$m_q = m_o\frac{S}{S^3} \qquad \textbf{Eq. 2.5}$$

Resulting in the quantum mass to celestial mass relativistic mass-scale equation of:

$$m_q = \frac{m_o}{S^2} \qquad \textbf{Eq. 3.0}$$

With this mass equation derived, we can now apply it the Jupiter's mass and derive its relativistic quantum equivalent as follows:

$$Jupiter_{quantum} = \frac{1.898x10^{27}kg}{(S)^2} = 1.56x10^{-19}kg \approx Electron\ charge = 1.6x10^{-19}C$$

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Eq. 4.0

The numerical value calculated matches exactly the numerical value of an electron charge. This coincidence is extremely interesting especially as it pertains to the initial hypothesis.

Using the $\boldsymbol{S}$ value derived in **Eq. 1.1** with Saturn's mass following is derived:

$$\boldsymbol{Saturn_{quantum}} = \frac{\mathbf{5.6846x10^{26}kg}}{(\boldsymbol{S})^2} = \mathbf{6.628x10^{-20}kg} \approx \boldsymbol{Electron\ charge} = \mathbf{1.6x10^{-19}C}$$

Eq. 4.1

These numerical values in **Eq. 4.0** and **Eq. 4.1** are too close to the value of an electron's charge to be considered solely coincidental. Granted Saturn is 41% the mass of Jupiter but it is still possible Saturn's mass it closer to that of Jupiter's mass making the numerical values even closer to that of an electron charge after applying it to **Eq. 3.0**.

The masses of the two outer gas giants, Uranus and Neptune, are significantly smaller than that of Jupiter and Saturn. As it pertains to a Beryllium atom, the two outer gas giants would be considered scale relatives to valence electrons. Valence electrons are naturally found in charge sharing molecular bonds between one or more systems. So hypothetically, it is possible that that the significant difference in mass of Uranus and Neptune are because our Solar System is in a mass-sharing bond, much like a charge-sharing bond, between one or more star systems. Of course that is strictly hypothetical but falls in line with the initial hypothesis

The units of kilograms (kg) and coulombs (C) are both of the Metric System and a product of its unitary symmetry. A coulomb is then equal to exactly $6.24150962915265 \times 10^{18}$ elementary charges. Combined with the present definition of the unit ampere, this proposed definition would make the kilogram a derived unit. Beyond that, the coincidence encircled within the initial hypothesis of this paper makes this relationship an undeniable mathematical anomaly. It is also important to note that Coulomb's charge experiments were very similar to experiments conducted on mass and gravity. The most likely explanation to this anomalous mathematical relationship is that the Universe is truly fractal in nature. As we already know, the quantum realm gives rise and constructs the celestial realm and all objects within it, thus fractal Universe is not a foreign concept, but what is foreign in concept is that scale is invariant between both realms and subsequent realms. A fractal Universe along with these anomalous mathematical coincidences detailed in this paper, allow for seemly independent units of measurement (dimension) to transition from into one another by the application of scale. These units of measurement are the same unit of measurement but being classified

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independent of one another due to an extreme difference in scale pertaining to a difference in space-time.

Electron charge is derived through direct measurement from current in an electric conductor. This means that electrons travel in a stream and the measured result would be a mean average of all electron charges. With this consideration, we calculate the average mean of all gas giant planet masses and deriving a value of $\boldsymbol{S}$ using the mass equation in **Eq. 3.0**, the following is derived:

$$\frac{\boldsymbol{Mass\ Sum\ of\ Jupiter, Saturn, Neptune, Uranus}}{\mathbf{4}} = (\boldsymbol{S})^2(\mathbf{1.6}\boldsymbol{x}\mathbf{10^{-19}})$$

Eq. 4.2

$$\boldsymbol{S} = \sqrt{\frac{\mathbf{2.6563}\boldsymbol{x}\mathbf{10^{27}}\boldsymbol{kg}}{\mathbf{4(1.6}\boldsymbol{x}\mathbf{10^{-19})}}} = \mathbf{6.44}\boldsymbol{x}\mathbf{10^{22}}$$

Eq. 4.2

$$\boldsymbol{c_o}^{\mathbf{2.691}} = \mathbf{6.44}\boldsymbol{x}\mathbf{10^{22}}$$

Eq. 4.3

$$\mathbf{2.691} \approx \boldsymbol{e} = \mathbf{2.718281828459}$$

Eq. 4.4

In **Eq. 4.4**, the value of 2.691 is very close to $\boldsymbol{e}$ when taking the average mass of all 4 gas giant planets in which both values are 98.99% similar to each other. Again, the numbers are too close to be solely coincidental suggesting a relativistic scale relationship does indeed exist between the celestial and quantum realms. It strongly warrants further analysis. This may also warrant a slight modification to the initial hypothesis which alludes to a possibility that there are different sized electrons or different densities as there are different sized gas giant planets of different mass-densities.

Considering rock planets, such as the Earth, and applying their mass to the mass equation in **Eq. 3.0** the derived number is as follows:

$$\frac{\boldsymbol{Mass\ of\ Earth}}{\boldsymbol{S^2}} = \frac{\mathbf{5.59736}\boldsymbol{x}\mathbf{10^{25}}\boldsymbol{kg}}{\boldsymbol{S^2}} = \mathbf{4.896}\boldsymbol{x}\mathbf{10^{-21}}\boldsymbol{kg}$$

Eq. 5.0

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This resulting numerical value in **Eq. 5.0** is small enough to be considered insignificant in comparison to the numerical value of an electron charge. It is almost 33 times smaller in mass. This falls in line with current convention of ignoring the very small charge moment held by neutrons. Since Earth is the heaviest rock planet it can be stated that this value correlates with the initial hypothesis that rock planets are neutrons. This does not take into consideration dwarf planets as they would be considered in scale relatives to sub-neutron quantum particles. It only considers the 4 rock planets and 4 gas giants to ascertain this paper's initial hypothesis of comparing our Solar System to the Beryllium atom. This small charge value derived in **Eq. 5.0** can hypothetically be attributed to a neutron's magnetic moment as only charged particles produce a magnetic field.

Thus far in this hypothetical analysis, if rock planets are relative neutrons, gas giants are relative electrons then the Sun should contain 4 or 5 celestial protons. Stars are hypothetically constructed of objects which can be relatively considered celestial protons that are fused together by the star's own matter. The resulting mass of these celestial protons, post star destruction, is similar to that of Jupiter though their size and density maybe greatly different. It is possible these celestial protons are the large remaining portions of debris after the star is shattered by a colliding celestial object which is in direct relative comparison to a neutron (or any other quantum particle) shattering the nucleus of an atom. Also the nuclear reactions contained in a star post destruction would be interfered and/or possibly ceased affecting the celestial proton's perceived mass as it pertains to its momentum and inertia. An object expelling radiation as in the form of a star's range of radiation would impede its momentum and inertia, so if this radiation were to cease it would alter its perceived momentum and inertia which would have direct implications on its relative quantum invariant rest mass. Again this is all hypothetical and almost impossible to validate except perhaps by examining supernovas in great detail though it does cast some doubt in the Sun's current calculated mass.

Fig 3.0 visual details the unique nature of our Solar System as it pertains to 4 rock planets and 4 gas giants. Visually it is undeniably apparent that the number 4 plays an important role in our Solar system as it does with a Beryllium atom.

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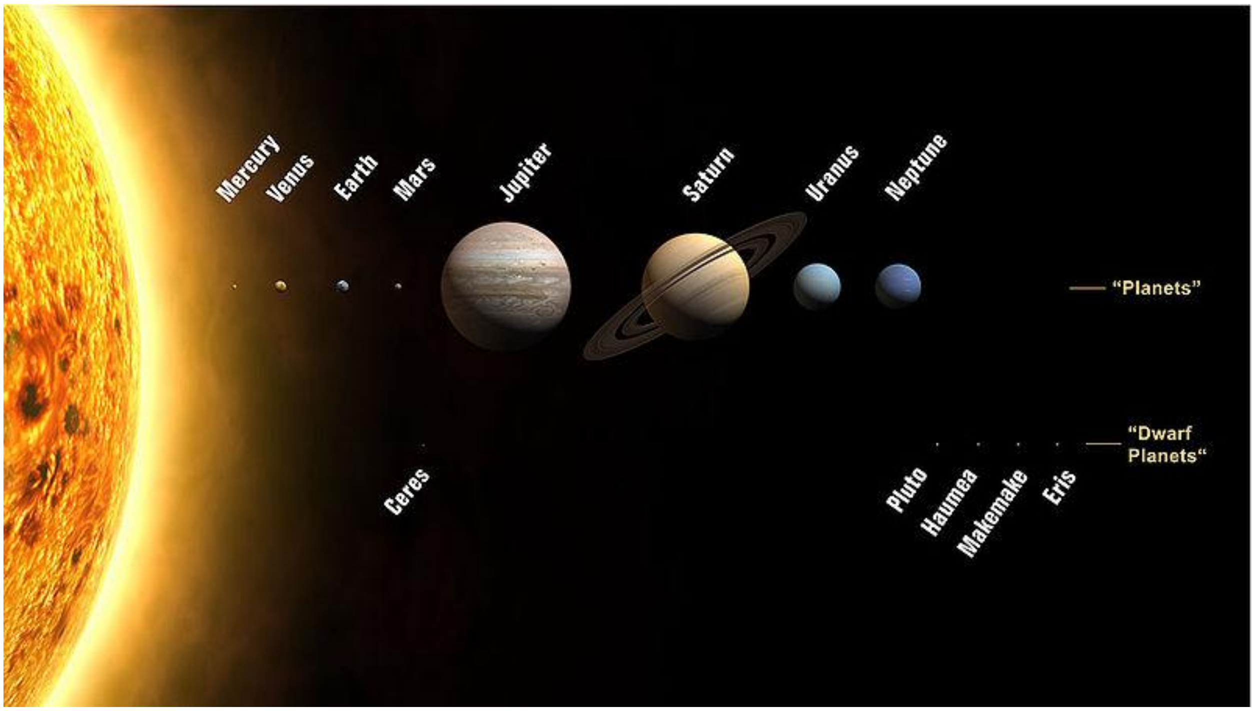

Invariant Mass of Quantum Particles

The problem of the current invariant mass of quantum particles must be addressed if this hypothesis is to gain some validity beyond mere coincidence. For example, if Jupiter is an electron and Earth is a neutron then why is the electron bigger than the neutron in mass? Conventional knowledge states that neutrons are bigger in mass than electrons but this is a bit puzzling. Earlier in this analysis the charge of quantum particles appear to have a direct link to mass of celestial object which accounts for electrons having a much larger charge compared to neutrons. But does having a larger charge also make the quantum particle larger? Actually there is a possibility and it's directly in how we measure the invariant mass of quantum particles. Consider how the quantum invariant mass is determined in a quantum mass energy detector which is similar fashion to the experiment depicted in **Fig. 4.0**. **Fig 5.0** is essentially the same experiment as shown in **Fig 4.0** but applied to quantum particles in a fashion similar to modern quantum particle mass detectors.

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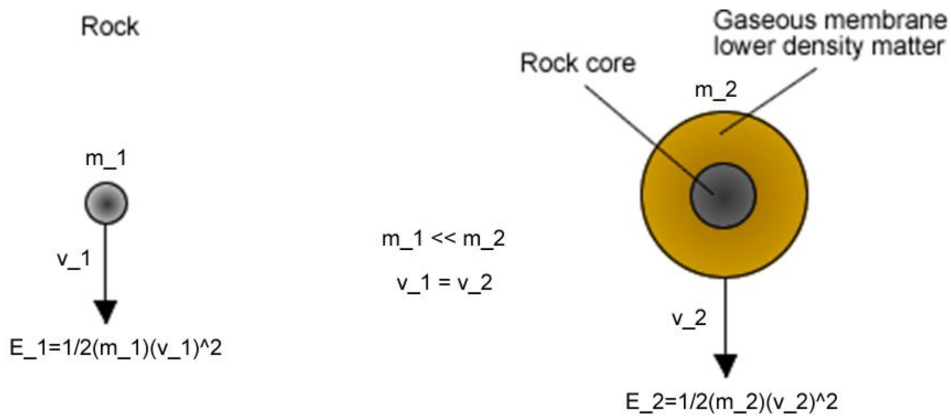

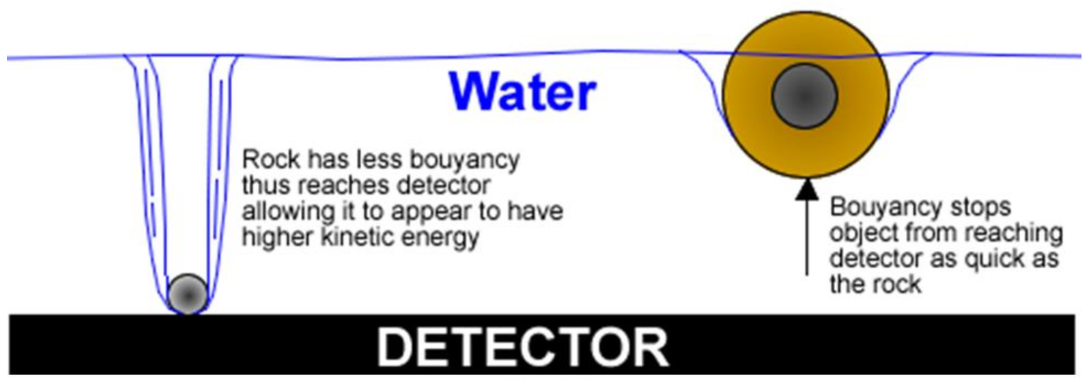

Fig 4.0

The magnetic field generator's output has an energy of E, as represented in **Fig. 5.0.** This field represents the magnetic field used to decelerate and detect quantum particles and their kinetic energy levels. **Fig 5.0** is an ideal situation and experiment. Both particles are made to travel at the same velocity prior to hitting the magnetic field.

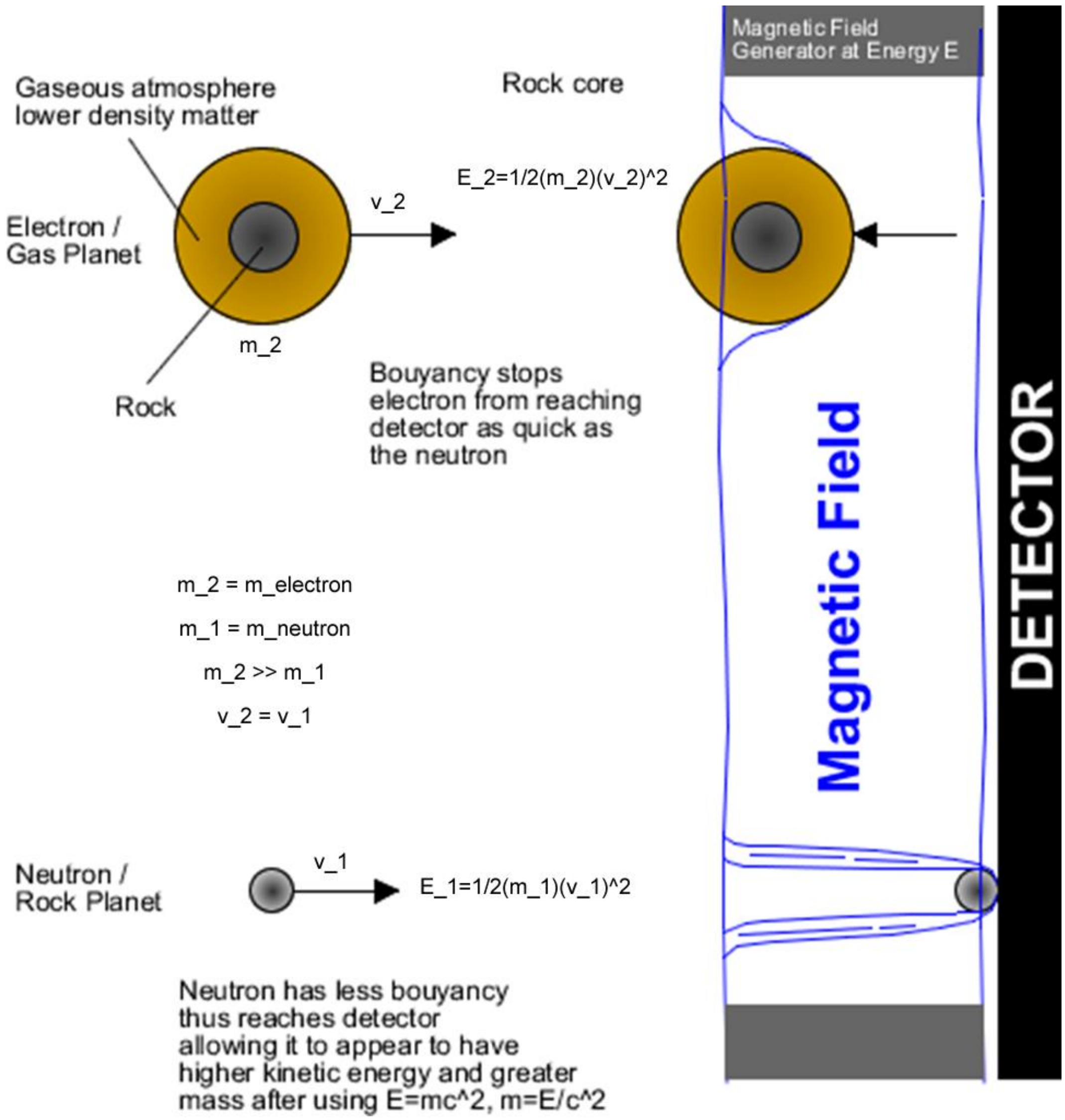

Fig 5.0

From this, it is then possible to derive the invariant mass of the quantum particles respectively as so:

$$m_{electron} \gg m_{neutron} \quad \textbf{Eq. 6.0}$$

$$v_{electron} = v_{neutron} = v \quad \textbf{Eq. 6.1}$$

$$Electron\ Kinectic\ Energy \gg Neutron's\ Kinetic\ Energy \quad \textbf{Eq. 6.2}$$
$$E_{electron} \gg E_{neutron}$$

$$E_{electron} = \frac{1}{2}\, m_{electron} v^2 \gg E_{neutron} = \frac{1}{2}\, m_{neutron} v^2 \quad \textbf{Eq. 6.3}$$

$$E = Energy\ of\ Generated\ Magnetic\ Field \quad \textbf{Eq. 6.4}$$

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If there is anything wrong with the current method of detection and calculation of the invariant mass of quantum particles is the following two equations **Eq. 6.5** and **Eq. 6.6** based on an assumption that the particle that reaches the detector first has more kinetic energy than the other thus has more invariant mass which is incorrect based on several reasons. We cannot directly see the particles to discern their relative sizes and sub-quantum composition visually without destroying them and we ignore to take in account the effect of electromagnetic buoyancy as the particles size and density are very different thus would not penetrate the magnetic field in the same way. The following equations detail how the current invariant mass of quantum particles are actually flipped due to these two assumptions.

$$\boldsymbol{Invariant\ Mass\ Energy\ of\ an\ Electon = E_{IM\ electron} = E - E_{electron}} \qquad \textbf{Eq. 6.5}$$

$$\boldsymbol{Invariant\ Mass\ Energy\ of\ a\ Neutron = E_{IM\ neutron} = E - E_{neutron}} \qquad \textbf{Eq. 6.6}$$

$$\boldsymbol{m_{IM\ electron} = \frac{2E_{IM\ electron}}{v^2} \ll m_{IM\ neutron} = \frac{2E_{IM\ neutron}}{v^2}} \qquad \textbf{Eq. 6.7}$$

But according to Einstein's mass-energy equation, the invariant rest mass of this quantum particles are:

$$\boldsymbol{m_{IM\ electron} = \frac{E_{IM\ electron}}{c^2} \ll m_{IM\ neutron} = \frac{E_{IM\ neutron}}{c^2}} \qquad \textbf{Eq. 6.8}$$

This accounts for why the the current invariant mass of quantum particles is not indicative of an equal relative relationship between the masses of their hypothetically equal celestial counterparts.

Barrier of Perception

Taking into consideration this is an exploratory analysis of the hypothesis that atoms are directly relative to star systems and vice-versa, then if they are the same relatively why do the two natural systems appear so different. I would argue that visual perception and subsequent understanding of anything is directly related to differences in space and time. The further away (pertaining to distance in space) from something the less we can directly observe, the more abstract it appears and the more we fail to consider. The same can be said for very small objects such as quantum particles. The less we can visually see something due to its tiny size, the more abstract it becomes and the more physical attributes we fail to consider. The same holds true for something traveling very fast. If an object is traveling very fast, it will appear as a haze visually to an observer thus becoming more abstract mentally in visual recognition

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(observation) and understanding. If a significant difference in size and relative passage of time due to speed is applied to an object, it would be very abstract visually and to our mental understanding. This may be the case with why atoms and star systems appear so different.

Fractal Universe

A fractal Universe with an invariant scale factor of $\boldsymbol{S}$ (Reality Scale Constant) between all Universal scale levels has enormous implications. As has been suggested, mass measured and derived at the celestial scale would transition to charge at the quantum scale. In scale invariance, an objects visible characteristics essentially remain the same, but how an observer at our scale perceives and understands a quantum object and its celestial equivalent would be very different. An object's characteristic (property) such mass transitions into another seemly independent property such as charge with the application of scale. If one property can be transitioned into another seemly independent property with the application of scale, then it strongly suggests other properties can also be related to other seemly independent properties between celestial and quantum objects. For example, if charge and mass are equivalents in this framework, then so are electrostatic force (or electromagnetism) and gravity.

$$\boldsymbol{G} = \boldsymbol{EM} \qquad \textbf{Eq. 6.9}$$

By understanding this relationship with the application of $\boldsymbol{S}$, properties associated with electric force can be superimposed and give insight into gravitational properties and vice-versa.

A fractal Universe has profound implications on almost all scientific theories. At a scale difference of $\boldsymbol{S}$ between reference frames of reality alludes to the possible fact that the celestial Universe is infinite in size. At a scale difference of $\boldsymbol{S}$, the quantum realm is $\boldsymbol{S}$ times bigger than the celestial Universe in a relative frame of reference as perceived by a quantum observer. For example, consider all the atoms in a single planet. If each one of those atoms are equivalent to star systems, then a single planet can be considered a universe in itself as there are more atoms comprising a planet such as the Earth than there are star systems observed in the night sky even with our most advanced observatories. This would strongly suggest that our own Universe is much larger than could have possibly been imagined. The size of the Universe is incomprehensible.

Along with a possible fractal nature, an infinite Universe again has profound implications. This means that every possible matter formation has an infinite number of equivalents in the Universe at our own scale of reality. For example, by applying simple mathematical deduction, the location and type of every atom on Earth, including the atoms in

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every living biological life form, has an infinite number of equivalents in our own Universal scale. This by far is the most staggering concept arising from this paper.

Space-Time Density

If star systems and atoms are relative equals then what makes them so different in size. Obviously the answer is a difference in space which inherently affects the passage of time thus a difference in space-time. If we were to envision a portion of space as a pliable substance that can be distorted and compressed by squeezing it to a smaller size, the amount of time to traverse that portion of space would be the same as if that portion of space had remained in its original state as perceived by the observer traveling through it, but to a second observer located outside that compressed portion of space, the first observer would travel exceptionally faster through the compressed space because the relative passage of time as seen by the second observer had increased for the first observer. Essentially the passage of time will increase for the first observer as seen by the second observer because more time is packed into a smaller relative area. This can be consider and called space-time density. Space-time density is better related to velocity frames of reference (a reinterpretation of inertial frames of reference).

The concept of velocity frames of reference is derived from the idea that the Universe itself, as a whole, has an almost static frame of reference which has implications on Einstein's Special Theory of Relativity. As observed by an observer living in the Universe, the Universe is seemly unchanged in the position of its stars, galaxies and galaxy clusters over an extremely long period of time. This unchanging characteristic is what astronomers use to reference locations in the sky in reference to our own location. Basically without this static frame of reference, our own position in the Universe would be undeterminable. Therefore a Universal static frame of reference can be used to determine the difference been two objects traveling at different velocities. In Einstein's Special Theory of Relativity, the velocity of both objects are only relative to each other if nothing else existed, but in correlation to a Universal static frame of reference, one object will always be traveling faster than the other thus existing in a different velocity frame of reference as perceived from this static frame of reference.

In a Universe with a static frame of reference, a traveling observer at velocity $\boldsymbol{A}$ will continually travel through and exist in more space than a relative stationary observer. Space-time is essentially denser for the traveling observer in comparison to the space-time of the stationary observer. This can be easily measured by the density of quantum particles traveling through objects in the vacuum of space or here on Earth. The faster an object, or observer, travels the more quantum particles travel through it. Therefore space-time (the two are inseparable) is denser for the travelling observer. The problem is for this traveler to experience normal momentum at velocity $\boldsymbol{A}$, or experience all of physics normally in all inertial frames of reference, the traveler's physical structure must shrink in size. Essentially, the ratio between space-time density and matter density would be a universal constant. Take into consideration **Fig 6.0**.

$$\zeta = Space\ Time \qquad \textbf{Eq. 7.0}$$

$$difference\ in\ distance = \Delta d = d\left[1 - \frac{1}{s}\right] \qquad \textbf{Eq. 7.1}$$

$$difference\ in\ time = \Delta t = t_2 - t_1 \qquad \textbf{Eq. 7.2}$$

$$k = \frac{\rho_\zeta}{\rho_{matter}} \qquad \textbf{Eq. 7.3}$$

The depiction in **Fig 6.0**, where s is the scaling variable, it details the distortion or compression of space which subsequently also affects the passage of time in denser space-time (ζ) or in a higher velocity frame of reference. Essentially more time is "packed" into a compressed relative volume of space.

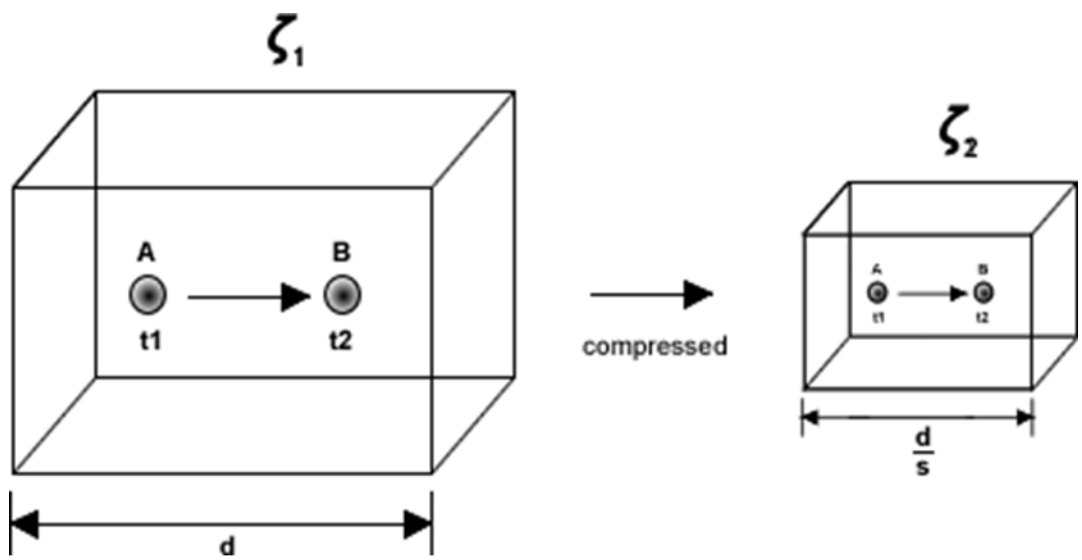

Fig 6.0

This means that from our relative frame of reference, objects in this compressed (denser) space-time region would experience the passage of time faster compared to us. The question that arises is how faster? According to Einstein, the Speed of Light is the limit, so by increasing the passage of time the resulting relative velocities should not exceed $\boldsymbol{c}$. That is one

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general interpretation. It can be also considered that at a scale difference of $\boldsymbol{S}$ times smaller, that these objects travel and exist near or at the speed of light in an atom around its nucleus. Considering velocity frames of reference, $\boldsymbol{c}$ is the most likely natural velocity at a scale value of $\boldsymbol{S}$ times smaller; therefore $\boldsymbol{c}$ will be the velocity reference determining a scale dependent time difference limit. From our frame of reference, let's assume the $\Delta\boldsymbol{t}$ in the **Fig 6.0** and **Eq. 7.2** for space-time $\boldsymbol{\zeta_1}$ is equal to exactly 1 second and that $\boldsymbol{d} = 1$ meter (m). This would give the traveling object a velocity of 1 m/s. In $\boldsymbol{\zeta_2}$ the velocity of the object traveling from point A to B cannot surpass the velocity of $\boldsymbol{c}$ at a scale difference of $\boldsymbol{S}$. This means its maximum velocity can only be 3x10^8 m/s and the passage of time cannot be smaller than 1/(3x10^8) seconds. This is only attainable if the object is reduced in scale by a factor of $\boldsymbol{S}$ in order to maintain the space-time to matter density constant detailed in **Eq. 7.3** for each unique type of matter that exists. In $\boldsymbol{\zeta_2}$, if $\boldsymbol{s} = \boldsymbol{S}$ then passage of time ($\Delta\boldsymbol{t}$) is:

$$\Delta \boldsymbol{t} = \frac{\mathbf{1}}{\mathbf{3x10^8}} \boldsymbol{seconds}$$ **Eq. 7.4**

Therefore as $\boldsymbol{s}$ approaches $\boldsymbol{S}$, $\Delta\boldsymbol{t}$ of 1 second approaches a relative time-frame of reference equivalent of (1/3x10^8) seconds.

$$\Delta \boldsymbol{t} = \frac{\mathbf{1}}{\boldsymbol{c_o}\left(\frac{\boldsymbol{s}}{\boldsymbol{S}}\right) + \mathbf{1}}$$ **Eq. 7.5**

Therefore if $\boldsymbol{s} = \mathbf{1}$, which is our space-time density then $\Delta\boldsymbol{t}$ is 1 second and if $\boldsymbol{s} = \boldsymbol{S}$ then $\Delta\boldsymbol{t}$ is $(\mathbf{1}/\boldsymbol{c_o})$ seconds.

If the object traversing the distance from point A to B were an observer, this observer would experience the same amount of passed time travelling between the two points no matter the magnitude of space-time density he may be in. To the observer inside his own space-time density it's always experienced the same. Therefore from the travelling observers perspective, space-time density is always perceived normal except in moments of acceleration as he moves from one velocity frame of reference to another or one space-time density to another. It is also hypothesized that acceleration of an object not only stresses the object due to inertia but also stresses the space-time medium itself in correlation to Newton's Third Law. Therefore following is also true from a velocity frame of reference:

$$\Delta \boldsymbol{t_q} = \Delta \boldsymbol{t_o}\left(\boldsymbol{c_o}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right) + \mathbf{1}\right)$$ **Eq. 7.6**

Where $\boldsymbol{c_o}$ = 3x10^8 (no units), $\boldsymbol{v}$ is velocity of object, $\boldsymbol{c}$ is the speed of light (3x10^8 m/s), $\Delta\boldsymbol{t_o}$ is passage of time from a stationary point, $\Delta\boldsymbol{t_q}$ is passage of time of the moving object as seen by a stationary observer.

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$$\boldsymbol{s} = \mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{e}$$ **Eq. 7.7**

$$\Delta \boldsymbol{l_q} = \frac{\Delta \boldsymbol{l_o}}{\mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{e}}$$ **Eq. 7.8**

Where $\boldsymbol{s}$ is the scale difference based on the velocity of the object as seen from our frame of reference, $\Delta \boldsymbol{l_o}$ is initial length of the travelling object at a stationary point, $\Delta \boldsymbol{l_q}$ is the length of moving object as seen by a stationary observer. This equation is unique because as the relative velocity surpasses the speed of light mathematically as perceived from our frame of reference ($\boldsymbol{v} > c$) then as $\boldsymbol{v}$ approaches $\boldsymbol{c_o^2}\ \boldsymbol{m/s}$, where $\boldsymbol{c_o} = 3\text{x}10^8$, then the following is also true for the sub-quantum scale in a fractal Universe at a relative quantum speed of light ($\boldsymbol{c_o^2}\ \boldsymbol{m/s}$):

$$\boldsymbol{v} \rightarrow \boldsymbol{c_o^2}\ \boldsymbol{m/s}$$ **Eq. 7.9**

$$\boldsymbol{s} = \mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{c_o c}}{\boldsymbol{c}}\right)^{e} = \mathbf{1} + \boldsymbol{S}(\boldsymbol{c_o})^{e} = \mathbf{1} + \boldsymbol{S}(\boldsymbol{S}) = \mathbf{1} + \boldsymbol{S}^{2} \cong \boldsymbol{S}^{2}$$

This value of $\boldsymbol{S}$ squared is the exact scaling factor from celestial to the sub-quantum scale where the quantum relative speed of light is $\boldsymbol{c_o^2}\ \boldsymbol{m/s}$.

Now that we've considered scale as it pertains to size and the relative passage of time, we will consider the effect on mass for of an object in compressed, denser space-time as it pertains to its velocity frame of reference. Considering **Eq. 3.0**, the following equation can easily be derived:

$$\boldsymbol{m_q} = \frac{\boldsymbol{m_o}}{\left(\mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{e}\right)^{2}}$$ **Eq. 8.0**

where $\boldsymbol{m_o}$ is initial mass and $\boldsymbol{m_q}$ is resulting mass at velocity $\boldsymbol{v}$ as perceived by a stationary observer. This does not take into consideration the celestial gravity fields around celestial objects and how they affect this equation and/or persist normalcy in the space-time density around large celestial objects due to their immense masses as observed by the effect of time dilation due to their gravitation fields. The time dilation effect, due to gravitational fields, inadvertently also effect the perception of space as time and space are permanently inseparable.

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Space-Time Ecosystems

As was mentioned, all planets, in fact all matter, generate a gravitational field, or a specific level of space-time density at their surface which extends out exponentially getting weaker the further away from the surface. Due to this generated density of space-time at the surface of all objects, more importantly on planetary surfaces, the bending of this space-time would hypothetically be more difficult in the presence of persisting gravitational field and **Eq. 7.7** would look more like:

$$\boldsymbol{s = 1 + S\left(\frac{v}{c}\right)^{2e}} \qquad \textbf{Eq. 8.1}$$

This equation was derived by considering the circular area but using the velocities as their radius where $\boldsymbol{v \rightarrow c}$ due to its natural exponent as depicted in **Fig 7.0**.

$$\boldsymbol{\frac{A_v}{A_c} = \frac{\pi(v)^2}{\pi(c)^2} = \frac{(v)^2}{(S)^2} = \frac{v^2}{c^2} = \left(\frac{v}{c}\right)^2} \qquad \textbf{Eq. 8.2}$$

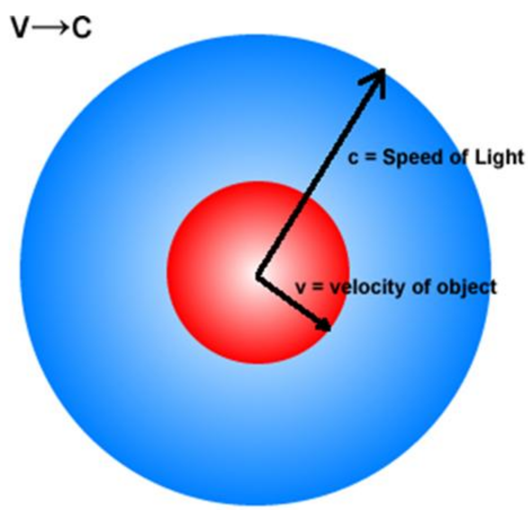

Fig 7.0

The preceding **Eq. 8.1** would subsequently change the following length, time and mass velocity transform equations to become suitably compliant with Einstein's relativity and the Lorentz transformation:

$$\boldsymbol{\Delta l_q = \frac{\Delta l_o}{1 + S\left(\frac{v}{c}\right)^{2e}}} \qquad \textbf{Eq. 8.3}$$

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$$\boldsymbol{m_q} = \frac{\boldsymbol{m_o}}{\left(\mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{2e}\right)^2} \quad \textbf{Eq. 8.4}$$

$$\Delta \boldsymbol{t_q} = \Delta \boldsymbol{t_o}\left(\mathbf{1} + \boldsymbol{c_o}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^2\right) \quad \textbf{Eq. 8.5}$$

Forces

The explanation of a difference in force strength between certain fundamental forces can be fairly well derived by the application of scale and the subsequent relative time difference. As discussed before, electric force and gravity force are relative scale equivalents due to the charge scale equivalence to mass. The problem is from our frame of reference, electric force is much stronger compared to gravity. The explanation, derived from the framework detailed in this paper, is that this difference in strength is due to the difference in passage of time between the quantum and celestial realm. Take for example Newton's law of force.

$$\boldsymbol{F} = \boldsymbol{ma} \quad \textbf{Eq. 8.6}$$

This fundamental law of force has within it a time component squared in the acceleration variable. At the quantum scale, as mentioned before, the passage of time is accelerated by a reference velocity of $\boldsymbol{c}$. By applying the **Eq. 8.4** and **Eq. 8.5** with **Eq. 8.6**, the following is derived detailing a strength in force as the object's velocity $\boldsymbol{v}$ approaches the speed of light $\boldsymbol{c}$.

$$\boldsymbol{F} = \frac{\boldsymbol{ma}}{\left(\mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{2e}\right)^2}\left(\mathbf{1} + \boldsymbol{c_o}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^2\right)^2 \quad \textbf{Eq. 8.7}$$

The same can be applied to the strength of a gravitational field produced by an object of mass $\boldsymbol{M}$ as its velocity frame of reference $\boldsymbol{v}$ approaches the speed of light $\boldsymbol{c}$. The Gravitational Constant $\boldsymbol{G}$ also has a time component squared.

$$\boldsymbol{F} = \frac{\boldsymbol{GM}}{\boldsymbol{r}^2} \quad \textbf{Eq. 8.8}$$

$$\boldsymbol{F} = \frac{\boldsymbol{GM}}{\boldsymbol{r}^2}\frac{\left(\mathbf{1} + \boldsymbol{c_o}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^2\right)^2}{\left(\mathbf{1} + \boldsymbol{S}\left(\frac{\boldsymbol{v}}{\boldsymbol{c}}\right)^{2e}\right)^2} \quad \textbf{Eq. 8.9}$$

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It is important to note that the field strength depicted in **Eq. 8.9** is still less than its electric force, relativistic scale, equivalent by a numerical factor of exactly 1498.5763. This divergence is in direct correlation with the Gravitational Constant G transition to a velocity frame of reference near or at the speed of light. At this velocity, distance and scale remain invariant and mass transitions into charge, thus the only remaining variable to account for this divergence in the expected field strength is G.

$$\frac{k_e}{(G)(c_o{}^2)} = \frac{\left(\frac{1}{4\pi\varepsilon_o}\right)}{(G)(c_o{}^2)} = \frac{8.987551787368x10^9\ N.m^2/C^2}{(6.67300x10^{-11}\ m^3/kg/\ s^2)(299792458)^2} = 1498.5764\ N.kg.s^2.m^{-1}.C^{-2} \quad \textbf{Eq. 9.0}$$

$$k_G = 1498.5764 \quad \textbf{Eq. 9.1}$$

Not counting for why this divergence exists, though it is most likely due to unconsidered changes in the properties of space between celestial and quantum velocity frames of reference and for the fact that G also has a mass component, the value in **Eq. 9.1** can be incorporated into **Eq. 8.9**. as follows:

$$F = \frac{GM}{r^2}\frac{\left(1 + c_o\left(\frac{v}{c}\right)^2\right)^2\left(1 + k_G\left(\frac{v}{c}\right)^2\right)}{\left(1 + S\left(\frac{v}{c}\right)^{2e}\right)^2} \quad \textbf{Eq. 9.2}$$

Another formulation of **Eq. 9.2** to take in account the value k_G is as follows:

$$F = \frac{GM}{r^2}\frac{\left(1 + \sqrt{k_G}\,.c_o\left(\frac{v}{c}\right)^2\right)^2}{\left(1 + S\left(\frac{v}{c}\right)^{2e}\right)^2} \quad \textbf{Eq. 9.3}$$

It is important to point out a very interesting mathematical relation using the non-unit values of k_G, c_o and S used in this paper:

$$(k_G\,.c_o)^2 \approx 2(S) \quad \textbf{Eq. 9.4}$$

A complete gravitational formulation incorporating this paper's hypothesized relativistic velocity frames of reference is as follows:

$$F = \frac{GMm}{r^2}\frac{\left(1 + c_o\left(\frac{v}{c}\right)^2\right)^2\left(1 + k_G\left(\frac{v}{c}\right)^2\right)}{\left(1 + S\left(\frac{v}{c}\right)^{2e}\right)^4} \quad \textbf{Eq. 9.5}$$

The **Eq. 9.5** is comprehensive in representing the relativistic force equivalencies relation described in this paper between the celestial and quantum realm, but does not account for the repulsive and attractive behavior between like and oppositely charged quantum particles. It is well known that quantum particles which are accelerated in velocity produce an electromagnetic field that propagates in the form of a wave. It is also well known that quantum particles radiate forces fields which are themselves also wave propagations in the nothingness of the medium that is space-time itself. It is postulated here that these force field wave propagations by quantum particles interact via wave interference super-positioning constructively or destructively between two or more charged quantum particles. It is further postulated that destructive superposition interference of these force field wave propagations results in a repulsive force between two free floating objects of similar to exact mass-density composition. Constructive superposition interference of these force field wave propagations results in attractive force between two free floating objects of significant difference in mass-density composition. Following these postulations that are supported by modern wave and quantum theory, these postulations can also be superimposed on celestial objects such as gas giant planets as this paper has detailed a direct relativistic scale equivalence link between electrons and gas giants. The following **Fig. 8.0** depicts this interaction visibly:

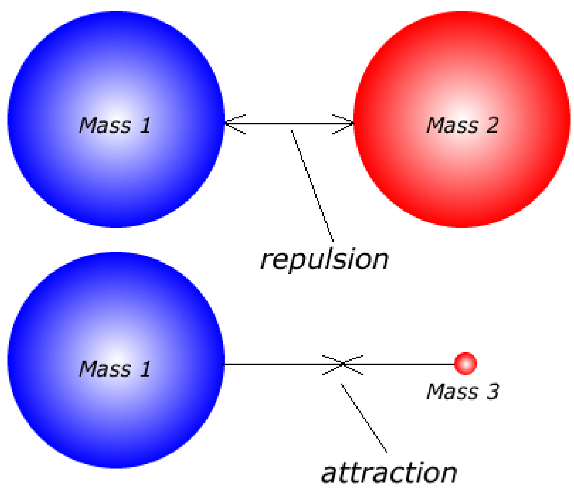

Fig 8.0

Considering this hypothesized interchange between quantum and celestial physical theories the following equation is formulated:

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$$F = \frac{GMm}{d^2} \frac{\left(2\left|\frac{M\frac{r_m{}^3}{r_M{}^3} - m\frac{r_M{}^3}{r_m{}^3}}{M\frac{r_m{}^3}{r_M{}^3} + m\frac{r_M{}^3}{r_m{}^3}}\right| - 1\right)\left(1 + c_o\left(\frac{v}{c}\right)^2\right)^2\left(1 + k_G\left(\frac{v}{c}\right)^2\right)}{\left(1 + S\left(\frac{v}{c}\right)^{2e}\right)^4} \quad \textbf{Eq. 9.6}$$

The preceding **Eq. 9.6** again does a good job of detailing very exactly the force behaviors of quantum objects with this new hypothesized framework while maintaining established celestial physical mechanics. It is now important to detail the gravitational effects between star systems in this new framework. Currently **Eq. 9.6** considers the velocity frame of reference $v = 0$ our relative frame of reference and as $v \to c$ for a celestial object (or macro object), that object literally becomes a quantum equivalent. Thus for us to consider the gravitational interactions between stars, we have to move our perspective frame of reference to an S value higher, or a velocity frame of reference slower. This can simply be formulated by multiplying **Eq. 9.6** with the three constants in the extended formulation (c_o, k_G, S) and squaring the limiting speed of light constant to attain a much slower velocity frame of reference limit. Essentially the squared numerical value of the speed of light c_o^2 represents the scale equivalent to the speed of light at the quantum scale (S level lower) as depicted in **Eq. 7.9.** It is then postulated that the square-root of the speed of light represents the speed of light at a super celestial scale (S level higher). Using the non-unit numeric value of the speed of light c_o value from **Eq. 1.2**, the following two equations are derived with **Eq. 9.8** describing celestial mechanics quite well:

$$c_S = \sqrt{c_o}\, m/s = 17314.52\, m/s \quad \textbf{Eq. 9.7}$$

Remarkably, and interesting to note, this value is very close the sum of the orbital velocities of Jupiter and Saturn which is 13070 m/s and 9690 m/s respectfully. Speculating, this coincidence might have something to do with light and photons as excited electrons typically generate photons.

$$F = \frac{GMm}{d^2} \frac{\left(2\left|\frac{M\frac{r_m{}^3}{r_M{}^3} - m\frac{r_M{}^3}{r_m{}^3}}{M\frac{r_m{}^3}{r_M{}^3} + m\frac{r_M{}^3}{r_m{}^3}}\right| - 1\right)\left(1 + c_o\left(\frac{v}{c_S}\right)^2\right)^2\left(1 + k_G\left(\frac{v}{c_S}\right)^2\right)}{\left(1 + S\left(\frac{v}{c_S}\right)^{2e}\right)^4}\left(\frac{S^4}{c_o{}^2 k_G}\right) \quad \textbf{Eq. 9.8}$$

Reverse Uncertainty Principle

It can be said in this hypothetical analysis that quantum relatives to celestial objects travel near the speed of light in very high space-time density. This incredibly high velocity is what makes the orbital track of an electron virtually impossible to predict after it is disturbed by our analyzing instrumentation such as an electron microscope. The relative celestial equivalent would be having a star system bombarded by an endless stream of gas giants. The introduction of a single gas giant planet into our Solar System would greatly disturb the orbits of it planets in unpredictable ways. A question that arises with greatly accelerated time frames of reference is how would our Solar System look like in a billion or trillion years? It is virtually impossible to predict especially accounting for foreign celestial bodies or unknown influences entering our system over the course of billions of years. The Reversed Uncertainty Principle is essentially still the Uncertainty Principle found in quantum mechanics. It is the uncertainty of predicting the orbital paths of planets the further into the future we attempt to predict. At the atomic and quantum scale the passage of time is relatively faster than our own passage of time, as it has been hypothesized, by a factor of $3x10^8$ (the speed of light but no units) as an increase to the unit of seconds. So if we take that relative passage of time and attempt to predict the orbital paths of our planets in the equivalently relative far, far distant future from right now the further out in time you attempt to predict the more uncertain your predictions will be in relation to the actual reality. Also the further out you predict, your calculations have to take into consideration the unknown random external influences on our Solar System (or any star). The unknown can be external rogue planets, asteroids, supernova blast waves, and even the dark energy/matter like strong electromagnetic waves. By adding these unknown but yet possible external interferences, seemingly predictable predictions become uncertain and akin to the Heisenberg Uncertainty Principle but in reverse. Therefore, our Solar System, or any star system, may appear to be predictable in the near future but in the relative far distance future predictions made now are uncertain, thus the Reverse Uncertainty Principle.

Conclusions & Predictions

The conclusion derived from the mathematical observations of this hypothesis is that there is some interesting coincidences with a significant possibility of mass at the celestial scale being relatively equivalent to charge at the quantum scale, thus mass and charge are the same thing separated by a difference in relativistic space-time. Also, this paper strongly suggests that the Universe is fractal in nature and infinite in size.

With further mathematical and observable analysis of this hypothesis, it can possibly lead to a series of predictions resulting from our current understanding of quantum realm which can hypothetically be superimposed on celestial realm and vice-versa. Some of these predictions are:

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- Gravity between two gas giant planets would be repulsive which is relatively equivalent to two electrons repelling each other due to similar charge and its resulting charge repulsion force.
    - Objects of similar mass and density will repel each other; objects of a significantly different mass and density will attract each other.
- All star systems have gas giants orbiting an inner planetary system with an equivalent number of rock planets.
- All star systems have inner and outer asteroid belts.
- Star systems can be bonded to other star systems in the exact same way that atoms bond forming molecules and composite materials.

Physics and Astronomy Classification (PACS)

98.80.Jk - Mathematical and relativistic aspects of cosmology
31.30.jc - Relativistic corrections to atomic structure and properties
06.30.Dr -Mass and density
12.10.Kt - Unification of couplings; mass relations
98.80.-k - Cosmology
98.80.Qc - Quantum cosmology
03.00.00 - Quantum mechanics, field theories, and special relativity
04.00.00 - General relativity and gravitation
45.50.Pk - Celestial mechanics

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Updates

2009-08-24 - Added a substantial portion on gravity under the Force section. It's a reformulation of older gravity formula detailed in "The General Principles of Reality A" ebook and still within the same theoretical framework detailed this paper and ebook.

2009-10-08 - Eq. 8.2 Correction. Removed mathematical constant e from equation. Not needed.

2009-10-08 - Eq. 8.5 Correction to time transform equation. The velocity limiter portion of equation not raised to power of 2. Due to this further corrections were applied to Eq. 8.7, 8.9. 9.2, 9.3, 9.5, 9.6, 9.8.

2009-10-08 - Correction to note on Jupiter and Saturn's velocity comparison to the speed of light. It was incorrectly stated.

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